PATENT SPECIFICATION

583,693

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PROVISIONAL SPECIFICATION

Improvements relating to Friction Clutches

I, HENRY MARTIN KESTERTON, a British Subject, of Gase House, Wroxall, near Warwick, do hereby declare the nature of this invention to be as follows:—

This invention relates to friction clutches of the type comprising an outer annular member having a tapered inner peripheral surface of circular form, an inner member having a correspondingly tapered outer peripheral surface of polygonal form, rollers or other wedging means between the said surfaces, and a cage for retaining the wedging means in position.

The object of the invention is to provide an improved construction enabling smooth action of the clutch to be obtained in a simple and satisfactory manner.

The invention comprises a clutch of the type aforesaid having, in combination with the wedging means, a resilient cage adapted to effect frictional engagement with the outer member before the wedging means come into action, and to oppose the centrifugal forces associated with the wedging means, as well as to retain the latter in position.

In one manner of carrying the invention into effect, I mount on a driving shaft, and in spline or feather-key connection therewith, a slidable driving member having an annular portion the inner peripheral surface of which is of circular form and is also tapered. Freely mounted on the same shaft is another member (which in this arrangement is the driven member), and on this member is formed a portion which enters the first member and has an outer peripheral surface of polygonal form, this surface being also tapered in a manner which is complementary to the inclination of the inner peripheral surface of the first member. On the polygonal surface of the driven member are supported a number of rollers of cylindrical form. Alternatively wedging means of any other convenient form may be used. For example the said means may consist of metal pieces each formed with a flat at one side adapted to sit on a flat portion of the polygonal surface of the driven member and rounded at the opposite side where it co-operates with the circular peripheral surface of the driving member. The wedging means are retained axially by a split ring sprung into a groove in the driving member at one end of the said means, which ring may be a separate member or a part of the cage to be now described.

In accordance with my present invention I employ a cage in the form of a resilient split ring. This may be of any convenient cross section. In one convenient form it consists of a web part which lies across notches in the wedging means, and an outer peripheral flange which is gapped at intervals to allow the wedging means to make contact with the driving member. Also its inner peripheral edge is notched to locate the wedging means circumferentially.

Rotation of the cage relatively to the driven member is prevented by a stop extending from the driven member into a gap between the adjacent ends of the cage. This stop may be a plain peg secured to the driven member. Or it may be a metal wedge which sits on one of the flats of the driven member and lies between the adjacent ends of the cage which are mutually inclined. Or it may consist of a spring loaded wedge which has its inner end located in a cavity in the periphery of the driven member, the spring serving to press the wedge between mutually inclined ends of the cage.

Further the said resilient ring forming the above described cage has its outer periphery inclined in a similar manner to the inner peripheral surface of the driving member, and the outer diameter of the ring (before contraction) is slightly larger than that of an imaginary circle drawn around and in contact with the wedging means.

The mode of action is as follows:—

When the clutch is released by lateral movement of the driving member relatively to the driven member, the cage expands. When bringing the clutch into action by an opposite sliding movement of the driving member, the first effect is to establish frictional contact between the driving member and the cage, thereby reducing or eliminating relative rotation

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between the driving and driven members. A small further sliding movement of the driving member contracts the cage sufficiently to enable the wedging means to come into action. The cage thus enables the clutch parts to be engaged smoothly.

From the foregoing it will be seen that the cage not only promotes smooth engagement of the driving and driven parts but it also opposes the centrifugal forces associated with the wedging means when the driven member is revolving and retains the wedging means in proper positions.

The invention is not, however, restricted to the example above described, as subordinate details may be modified to suit different requirements, and the parts herein described as the driving and driven members may be adapted to act as driven and driving members.

Dated this 16th day of November, 1944.

MARKS & CLERK.

COMPLETE SPECIFICATION

Improvements relating to Friction Clutches

I, HENRY MARTIN KESTERTON, a British Subject, of Gase House, Wroxall, near Warwick, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to friction clutches of the type comprising an outer annular member having a tapered inner peripheral surface of circular form, an inner member having a correspondingly tapered outer peripheral surface of polygonal form, rollers or other wedging means between the said surfaces, and a cage for retaining the wedging means in position.

The object of the invention is to provide an improved construction enabling smooth action of the clutch to be obtained in a simple and satisfactory manner.

The invention comprises a clutch of the type aforesaid having, in combination with the wedging means, a resilient cage adapted to effect frictional engagement with the outer member before the wedging means come into action, and to oppose the centrifugal forces associated with the wedging means as well as to retain the latter in position.

In the accompanying sheets of explanatory drawings, Figures 1 and 2 are similar sectional side elevations respectively showing in the inoperative and operative positions a clutch embodying the invention, and Figure 3 is a sectional end elevation, Figure 2 being taken on the line 2—2 of Figure 3. Figures 4 and 5 are respectively sectional side and end elevations corresponding to Figures 1 and 3 and illustrating a modified form of my invention, Figure 4 being taken on the line 4—4 of Figure 5. Figure 6 is a sectional end view illustrating a modified detail applicable to either of the constructions shown in Figures 1—3, or Figures 4 and 5.

Referring to Figures 1—3, I mount on a driving shaft *a*, and in spline or feather-key connection therewith, a slidable driving member *b* having an annular portion the inner peripheral surface *c* of which is of circular form and is also tapered. Freely mounted on the same shaft is another member *d* (which in this arrangement is the driven member), and on this member is formed a portion which enters the first member and has an outer peripheral surface of polygonal form, this surface being also tapered in a manner which is complementary to the inclination of the inner peripheral surface of the first member. On the polygonal surface of the driven member are supported the wedging means which consist of a number of rollers *e* of cylindrical form. Alternatively wedging means of any other convenient form may be used. For example the said means may consist of metal pieces each formed with a flat at one side adapted to sit on a flat portion of the polygonal surface of the driven member and rounded at the opposite side where it co-operates with the circular peripheral surface of the driving member. The wedging means are retained axially by a shoulder *m* on the member *d* and by a split ring *f* sprung into a groove in the driven member at one end of the wedging means.

In accordance with my present invention I employ a cage in the form of a resilient split ring. This may be of any convenient cross section. In one convenient form it consists of a web part *g* which lies across notches in the wedging means, and an outer peripheral flange *h* which extends from one side of the web and is gapped at intervals to allow the wedging means to make contact with the driving member. Also its inner peripheral edge is notched to locate the wedging means circumferentially.

Rotation of the cage relatively to the driven member is prevented by a stop *i* extending from the driven member into a gap between the adjacent ends of the cage. This stop may be a plain peg secured to the driven member. Or it may consist (as

shown in Figure 6) of a spring loaded wedge *k* which has its inner end located in a cavity in the periphery of the driven member, the spring *l* serving to press the wedge between mutually inclined ends of the cage.

Further, the said resilient ring forming the above described cage has the outer periphery of the part *h* inclined in a similar manner to the inner peripheral surface of the driving member. Moreover, the outer periphery of the ring (before contraction) projects slightly beyond the wedging means, but sufficient clearance exists between the inner periphery of the web part of the ring and the bottoms of the notches in the wedging means to allow the latter to operate when the ring is contracted.

The mode of action is as follows:—

When the clutch is released by lateral movement of the driving member relatively to the driven member, the cage expands. When bringing the clutch into action by an opposite sliding movement of the driving member, the first effect is to establish frictional contact between the driving member and the peripheral surface *h* of the cage, thereby reducing or eliminating relative rotation between the driving and driven members. A small further sliding movement of the driving member contracts the cage sufficiently to enable the wedging means to come into action. The cage thus enables the clutch parts to be engaged smoothly.

From the foregoing it will be seen that the cage not only promotes smooth engagement of the driving and driven parts but it also limits movement of the wedging means by centrifugal force when the driven member is revolving and thereby retains the wedging means in proper positions.

The modification shown in Figures 4 and 5 is essentially similar to the construction above described, but differs in that the retaining ring *f* is dispensed with, and instead the inner periphery of the web part *g* of the cage is engaged with a groove in the driven member, so that the cage serves the same purpose as the ring *f* as well as its other function above described. Also the inner periphery of the web part *g* is made of polygonal form, so that it cannot rotate relatively to the driven member on which it is mounted. Further the wedging means consist of plain rollers, the part *h* of the cage being gapped to allow the rollers to make contact with the driving member when the latter is moved to its operative position.

The invention is not, however, restricted to the example above described, as subordinate details may be modified to suit different requirements, and the parts herein described as the driving and driven members may be adapted to act as driven and driving members.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A clutch of the type specified and having, in combination with the wedging means, a resilient cage adapted to effect frictional engagement with the outer member before the wedging means come into action, and to oppose the centrifugal forces associated with the wedging means, as well as to retain the latter in position.

2. A clutch as claimed in Claim 1 in which the cage consists of a web part from one side of which extends a peripheral flange, the latter being gapped to accommodate the wedging means.

3. A clutch as claimed in Claim 2 in which the web part of the cage lies across notches in the wedging means.

4. A clutch as claimed in Claim 2, in which the wedging means are located wholly at one side of the web part of the cage.

5. A clutch as claimed in Claim 1, having a split annular cage and a spring loaded wedge piece located between the adjacent ends of the cage.

6. A clutch as claimed in Claim 1, and comprising any of the combinations and arrangements of parts substantially as described and as illustrated by the accompanying drawings.

Dated this 27th day of July, 1945.

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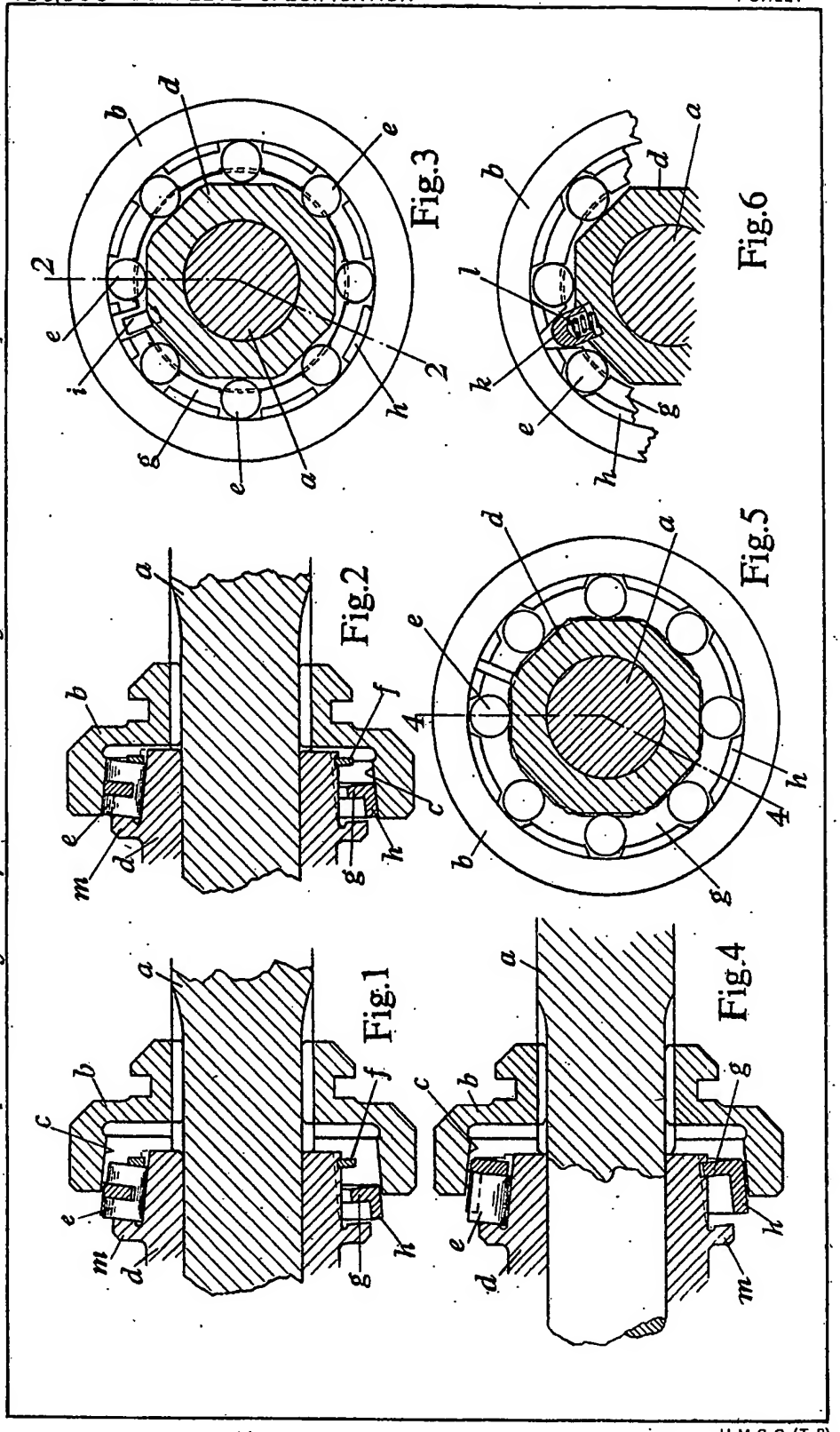
[This Drawing is a reproduction of the Original on a reduced scale.]
Fig.1
Fig.2
Fig.3
Fig.4
Fig.5
Fig.6

H.M.S.O. (Ty.P.)